Key Accomplishments
In Water Quality Research from 1995-2005
January 9, 2006

LTG 2	DIAGNOSING CAUSES OF IMPAIRMENT
1996	*Marine TIE guidance:* EPA 1996. *Marine Toxicity Identification Evaluation (TIE) Phase I Guidance Document*. September, 1996. EPA/600/R-96/054. Guidance provides water quality managers tools to identify toxic chemicals causing toxicity in effluents discharged to the marine receiving waters. The guidance is also useful for TIEs performed on receiving waters and sediment interstitial waters.
1999	*TIE guidance:* EPA 1999. *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*. August 1999. EPA/833/B-99/002
1999	*Sediment toxicant identification:* Development of methods to characterize and identify metal toxicants in contaminated sediments (freshwater and marine)
1999-2001	*Watershed classification pilot*: This NHEERL pilot project demonstrated the utility of the watershed classification approach through application of a probability-based design to tributaries of western arm of Lake Superior. The watershed classification allowed researchers to predict biotic, chemical, and habitat quality of different watershed classes. Watershed classification maps were provided to the Lake Superior Basin planning teams in MN and WI.
2000	As a collaborative effort with OW, developed the *Stressor Identification Guidance Document* (EPA/822/B-00/025) in 2000 to assist water resource managers identify the causes of biological impairment. This report provides a systematic, scientifically-sound method for diagnosing the causes of adverse biological changes in aquatic systems. It has been used by the scientists in the regions and states to direct management activities, including TMDL development, toward the chemical, physical or biological factors that will most improve biological condition. Case studies to supplement the guidance were published in 2001.
2000	*Sediment toxicant identification:* Development of methods to characterize and identify ammonia as a toxicant in contaminated sediments (freshwater and marine)
2001	ORD provided EPA Region 6 with extensive data at the Canton field site, some of which were used as the information base for EPA Region 6 to exercise rarely used emergency powers to compel swine farms to give families in the area safe drinking water and change land management practices.
2001	*Ecological risk assessment for the middle Snake River, Idaho*. EPA/600/R-01/017. Mathematical simulations and field observations were used to better understand how stressors such as altered river flow or sediment input impact macrophyte biomass or fish populations. This enables managers to explore alternative management options and make more informed decisions.
2002	*Clinch and Powell valley watershed ecological risk assessment*. EPA/600/R-01/050. This assessment makes clearer the connection between coal mining, agriculture, and urbanization with declines in fish and mussel species richness. These findings help the US Fish and Wildlife Service and The Nature Conservancy to encourage farmers and others to take management actions to minimize impacts on fish and mussels.
2002	*Wetlands classification module*: This web-based module was incorporated into an EPA series on methods for assessing wetlands condition. The module compares and contrasts different applications for classification based on both reference condition and sensitivity to nutrients.
2002	*Waquoit Bay's watershed ecological risk assessment*: The effect of land derived nitrogen loads on estuarine eutrophication. EPA/600/R-02/079. The models provided in this report provide the opportunity for managers to assess a variety of options to reduce nitrogen loads to their estuaries and to achieve the loads that could allow the return of eelgrass to the area.

2002-2004	Series *of Microbial Source Tracking Workshops/Factsheet* for EPA Regional Offices and States on the state-of-the-science and the use of molecular biological tools in water quality evaluation: Region 3, 9 and10 and ASWIPCA. Microbial Source Tracking Guide Fact Sheet for the board members of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA).
2003	*Watershed classification survey design*: A watershed-scale sampling framework was developed in cooperation with West Virginia state agencies, applied to a survey of fish communities in wadeable streams, and presented in an EPA Report. The project demonstrated that it is possible to assess stream condition as well as produce information on probability of impairment for different watershed classes.
2003	*ORD method for analysis of estrogens associated with CAFOs* published in *Journal of Chromatography*. ORD used this method to detect estrogens in ground water at Cimarron Pork field site and will be assessing other types of CAFOs in the future.
2003	Rapid PCR-based diagnostic techniques were developed to identify *Pfiesteria* complex organisms and better delineate their distribution. These techniques are used by both Maryland and Delaware departments of natural resources for water quality monitoring and assessment. NCER R82-7084 (Oldach)
2003	Obtained data needed to produce models of the biophysical interactions of *Karenia brevis* (red tide) with its chemical and physical habitat. This program, along with the larger ECOHAB program provides data to do large and small scale modeling of blooms. NCER R82-7085 (Stiedinger) and R82-6792 (Vargo)
2003	A successful preliminary evaluation of the use of clays to mitigate harmful algal blooms was completed in a joint effort with scientists at NHEERL. This research led to a subsequent pilot study (funded by NOAA) to address the "real-world issues" of clay dispersal and its effects in the field. NCER CR82-7091 (Anderson)
2004	ORD, EPA Region 6, USDA-NRCS, and USDA-ARS form ad hoc workgroup to focus research efforts on Comprehensive Nutrient Management Plans (CNMPs) associated with land application of CAFO waste. This marked the first extensive research collaboration between EPA and USDA and has thus far led to two collaborative research projects.
2004	*Causal Analysis Database of Literature (CADLit): Suspended and Settled Particle Module* - This effort will help risk managers determine if an impairment is due to excess sediment and will help them establish TMDL goals. This work also supports the development of guidance for states and tribes to set standards for bedded and suspended sediments, a joint ORD/OW effort. The CADlit database is available as a compact disc by request for EPA personnel and scientific collaborators.
2004	Several publications and a final report discussing the mechanisms of lesion initiation and the contributory environmental and biological conditions required for the progression of such lesions in fish following exposure to *Pfiesteria* complex organisms. This research furthered the understanding of lesion formation in menhaden and its relationship to *Pfiesteria*. NCER R82-8225 (Shields)
2004	*Sediment Toxicant Identification*: Development of methods to characterize, fractionate, and identify organic toxicants in contaminated sediments (freshwater and marine)
2005	*Microbial Source Tracking Guide Document* (EPA/600-R-05-064). This report provides scientists, engineers, and environmental managers with a comprehensive, interpretive analysis of current microbial source tracking (MST) information.
2005	*Watershed classification:* Tested and applied three approaches for classifying all HUC12 watersheds in EPA Region 5 in support of nutrient criteria development for streams, including comparison of nutrient-response relationships across watershed classes. Results will provide support for effects-based classification, as well as stratified nutrient-response relationships that can be used for criteria development. Provided input to watershed ranking for Upper Mississippi River HUCs for EPA Region 5 as part of a nationwide exercise to prioritize watersheds for load reductions.
2005	*Coastal Classification:* Developed a coastal classification scheme to group estuarine watersheds by similarities in physical and hydrological characteristics. To comply with CWA 303(d) and TMDL regulations, states are required to diagnose the causes of biological impairment.

2005 - 2006	EPA, along with other Federal Agencies co-sponsored the first Interagency International Symposium on Cyanobacterial Harmful Algal Blooms (ISOC-HAB) in 2005. The final IISOC product produced in 2006 will be a monograph containing: 1) a synthesis paper describing a potential National Research Plan on Cyanobacteria; 2) six workgroup reports; 3) about 28 papers authored by the invited speakers; and 4) multiple poster abstracts. The monograph will be presented to the Task Force that HABHRCA requires to be established through the Committee on the Environment and Natural Resources for their use in meeting the mandates of HABHRCA.
Tech support	Provided Region 4 with a report on the application and comparison of DNA-based methodologies to be used in the development of microbial source tracking (MST) technology by the Region's laboratory support. Supported Fish and Wildlife Initiative in protecting a coastal critical habitat by assessing the exposure level of fecal contaminants.